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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/381,061	12/06/1999	MASAYUKI TODA	FUK-59	3463

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EXAMINER	
BUEKER, RICHARD R	

ART UNIT	PAPER NUMBER
1763	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/381,061	TODA ET AL.	
	Examiner	Art Unit	
	Richard Bueker	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-9* is/are rejected.

7)☒ Claim(s) *3* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The drawings are objected to because in Fig. 6©, the x-axis is incorrectly labeled "floating gas supply rate" when it should be "centering gas supply rate". Also, in Fig. 9(c), the x-axis is incorrectly labeled "floating gas supply rate", and should be "rotation gas supply rate". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

On page 19, line 16 of applicants' specification, "Fig. 3D" is incorrect and should be changed to "Fig. 3B".

Claims 1 and 4-8 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hiura (JP 59-215718).

Hiura discloses a wafer floating apparatus having fine pores for ejecting gas. Compare Fig. 2 of Hiura to applicants' Figs. 3(a)-3(c). Hiura teaches the use of (1) pores for floating the wafer (labeled 5 in Fig. 2), (2) pores for rotation (labeled 6) and (3) positioning gas pores (labeled 4). Hiura's positioning gas pores are disclosed as having the same position, the same discharge angle and the same function as applicants' centering pores, and thus Hiura's positioning gas pores are functionally equivalent to pores for centering and can be referred to as centering pores. Hiura's floating pores, centering pores and rotation pores have the same location, discharge angle and function as applicants' centering pores and rotation pores.

Applicants have argued that their alleged invention is distinguished from Hiura by the provision of a fourth group of pores, described as "auxiliary fine suppression pores configured for suppressing vibration of the substrate when the substrate is rotated at high speeds". Hiura does not specifically describe a fourth group of pores named "auxiliary fine suppression pores" in the manner that applicants do.

Applicants' auxiliary pores, as claimed and as described in the specification, do not distinguish over the fine pores taught by Hiura. First, it is noted that each group of fine pores recited in the claims is recited as "a plurality" of fine pores. The word "plurality" is defined as "the state of being plural", and "plural" is defined as "consisting of more than one". Thus, "a plurality of fine pores" only requires the presence of two pores. Each of Hiura's three functional groups of pores includes many more than two pores. If any one group of Hiura's three functional groups of pores also meet the requirements for applicants' claimed "auxiliary pores", then the extra claimed auxiliary

pores can be seen as simply being a few of the pores of one of Hiura's disclosed groups of pores. Thus, applicants' description of their auxiliary pores must be carefully compared to Hiura's description of his three functional groups of pores.

Applicants' description of their auxiliary pores can be found at page 6, lines 12-21 of the specification as follows:

> "the auxiliary fine pores are provided on a surface of the floating unit, and further fine pores are oriented to a center of the floating unit on a circle with a larger radius as compared to that of the floating unit at an angular space of 90 degrees therebetween in the outer side from the positions of the pores for rotation, so that, when a substrate body is rotated and a rotational speed of the substrate body is raised, the substrate body is prevented from jumping out from the floating apparatus".

Further description of applicants' auxiliary holes can be found at page 19, lines 7-19 of the specification as follows:

> "The group of auxiliary fine pores shown in Fig. 3B are provided on a surface of the floating unit 301 at positions on a circle with a radius of 40 mm in the outer side from a center of the floating unit 301 at an angular space of 90 degrees and are inclined to a center of the floating unit 301. However, a radius of the circle on which the fine pores 310e constituting the group of auxiliary fine pores is not always limited to 40 mm, and may be set to any value on the condition that the circuit is positioned in the outer side from a radius of the circuit on which the fine pores for rotation are provided. Also in Fig. 3D (sic: 3B) fine pores constituting a group of auxiliary fine pores are provided at an angular space of 90 degrees, but this angle may be set to an appropriate value."

Thus, applicants' rules require that their auxiliary pores are: (1) oriented or inclined to a center of the floating unit; (2) on a circle located on the outer side of the pores for rotation (i.e. the rotation pores 310d of applicants' Fig. 3(c) or rotation pores 6 of Hiura's Fig. 2) with respect to the center of the floating unit; and (3) located along said circle with any appropriate angular spacing.

It is noted, however, that Hiura's positioning pores (centering pores) (labeled 4 in Fig. 2 of Hiura) meet all the requirements for the auxiliary pores as applicants describe them in the specification. At page 9, lines 3-8 of the English translation, with reference to his Figs. 1 and 2, Hiura describes his positioning pores as follows:

> "A plurality of positioning gas spray nozzles [4] are located in a dispersed manner on a circle [4'] slightly larger than the outer periphery of the wafer [2], which is retained over the discharge port [3], with the discharge port [3] at the center and in a manner such that they are inclined toward said discharge port [3] side."

Hiura's positioning pores are (1) oriented or inclined to a center of the floating unit; (2) on a circle located on the outer side of the pores for rotation with respect to the center of the floating unit; and (3) located along said circle with an appropriate angular spacing. Thus, it can be seen that Hiura's positioning pores conform to applicants' rules for providing auxiliary pores. Hiura's positioning pores have the same location, discharge angle and function as applicants' auxiliary pores. Hiura's Fig. 2 illustrates 8 positioning pores, and they can be arbitrarily divided into two groups, with one group of Hiura's positioning pores being the "plurality of fine centering pores configured for centering the substrate body at a center of a substrate body-floating apparatus" as recited in claim 1, and the other group of Hiura's positioning pores being the "plurality of auxiliary fine pores configured for suppressing vibration of the substrate when the substrate body is rotated at high speed". It is noted that the phrase "rotated at high speed" is a relative term, and the claims do not indicate in any way what rotation speed is considered high or low. Neither the claims nor the specification make any comparison to Hiura's rotation speed, Hiura being the closest prior art. It is noted also

that Hiura's positioning gas pores are angled inward to the center of the wafer, and thus inherently force the wafer toward the center, in the same manner as applicants' auxiliary pores. Hiura's positioning pores, therefore, act to center the wafer and to reduce any horizontal displacement from the center of the floating unit. Applicants' auxiliary pores are positioned and inclined in the same manner as centering pores, and would be expected to act in the same manner, as extra centering pores that prevent the wafer from "jumping out" when extra rotating force is applied.

Even if, for argument's sake, Hiura's centering pores are not considered to anticipate the recited auxiliary pores as argued above, it at least would have been prima facie obvious to modify the disclosed invention of Hiura by experimentally determining the optimum number of inwardly directed positioning gas nozzles required to smoothly float a wafer and prevent the wafer from "jumping out" of Hiura's wafer floating apparatus. It is noted that while Hiura's Fig. 2 illustrates eight positioning nozzles, one skilled in the art would recognize that eight nozzles is merely exemplary, and that the actual number required should be determined by routine experimentation. If some of the positioning nozzles or pores were arbitrarily labeled as "auxiliary", that name alone should not render them unobvious.

Hiura also discloses the use of "flotation gas spray nozzles [5]" which read on the "fine floating pores" recited in applicants' claim 1. See Fig. 2 and page 9, lines 11-18 of the English translation. Hiura describes the floating gas nozzles as follows:

> "Next, on a concentric circle [5'] located between the circle [4'] on which the plurality of positioning gas spray nozzles [4] are arranged and the discharge port [3]. A plurality of evenly dispersed flotation gas spray nozzles [5] are provided. These flotation gas spray nozzles [5] are provided in a manner such

that all of them are perpendicular to the retaining board [1] or such that all of them are inclined by a set angle toward the discharge port [3] side."

Claim 3 of Hiura also recites the flotation gas nozzles as follows:

"3. Said infrared irradiation treatment device for semiconductor substrates of claim 1 in which said plurality of flotation gas spray nozzles are provided in a manner such that they are inclined toward said discharge port by a set angle with respect to said retaining board."

Hiura teaches that his flotation pores can be (1) oriented or inclined to a center of the floating unit; (2) on a circle located on the outer side of the pores for rotation with respect to the center of the floating unit; and (3) located along said circle with an appropriate angular spacing. Thus, it can be seen that Hiura's flotation pores conform to applicants' rules for providing auxiliary pores. Hiura's flotation pores have the same location, discharge angle and function as applicants' auxiliary pores. Hiura's Fig. 2 illustrates eight flotation pores, and they can be arbitrarily divided into two groups, with one group of Hiura's flotation pores being the "plurality of fine floating pores configured for floating the substrate body" as recited in claim 1, and the other group of Hiura's flotation pores being the "plurality of auxiliary fine pores configured for suppressing vibration of the substrate when the substrate body is rotated at high speed". As previously noted, the phrase "rotated at high speed" is a relative term, and the claims do not indicate in any way what rotation speed is considered high or low. Neither the claims nor the specification make any comparison to Hiura's rotation speed. It is noted also that Hiura specifically claims that his flotation gas pores are angled inward to the center of the wafer, and thus inherently force the wafer toward the center, in the same

manner as applicants' auxiliary pores. Hiura's flotation pores, therefore, act to center the wafer and to reduce any horizontal displacement from the center of the floating unit. When Hiura suggests that his flotation gas nozzles 5 are inclined to the center, he is implicitly teaching that the flotation nozzles can be made to be supplemental centering nozzles, or "auxiliary" centering nozzles. Hiura's flotation nozzles 5 can be inclined to the center, and thus act as centering pores. They are multifunctional in the sense that that can act as flotation pores and as centering pores. They can be considered centering pores. Applicants' auxiliary pores are positioned and inclined in the same manner as centering pores, and would be expected to act in the same manner, as extra centering pores that prevent the wafer from "jumping out" when extra rotating force is applied.

Even if, for argument's sake, Hiura's inclined flotation nozzles are not considered to anticipate the recited auxiliary pores as argued above, it at least would have been prima facie obvious to modify the disclosed invention of Hiura by experimentally determining the optimum number of inwardly directed flotation gas nozzles required to smoothly float a wafer and prevent the wafer from "jumping out" of Hiura's wafer floating apparatus. It is noted that while Hiura's Fig. 2 illustrates eight flotation nozzles, one skilled in the art would recognize that eight nozzles is merely exemplary, and that the actual number required should be determined by routine experimentation. If some of the provided flotation nozzles or pores were arbitrarily named "auxiliary pores" (or "positioning pores", or "centering pores") that name alone should not render them unobvious.

It is noted also that applicants' specification clearly states that the fine floating pores, the fine centering pores and the fine rotating pores can be used to suppress vibration, by correctly adjusting the gas supply rate flowing through each of these groups of pores. See, for example, the following passages of the specification:

page 5, lines 5-7:

> "vibration of the substrate body in the horizontal direction [is] controlled to 10 mm or below by correctly adjusting a floating gas supply rate."

page 5, lines 13-16:

> "it is possible to suppress vibration of a substrate body in the horizontal direction to about 5 mm or less at a given floating height by correctly controlling a centering gas supply rate."

Page 6, lines 3-6:

> "By raising a rotational speed of the substrate body, vibration of a surface of a substrate body and inclination of the substrate body can be reduced."

Therefore, all of the fine floating pores, the fine centering pores and the fine rotating pores can be considered to inherently meet the claimed function of the "auxiliary fine suppression pores" of suppressing vibration. Since Hiura's floating, centering and rotating nozzles operate in the same manner as applicants' floating, centering and rotating pores, they should also be considered to inherently meet the claimed function of the claimed "auxiliary fine suppression pores" of suppressing vibration.

Regarding claim 8, it is noted that the preamble of claim 8 recites "(a) substrate body-floating type of film forming apparatus", while Hiura does not discuss using his

floating apparatus as a film forming apparatus. It is noted, however, that claim 8 does not recite any apparatus structure specifically relating to film forming. The reference to film forming in the preamble of claim 8 is a recitation of intended use, and Hiura's apparatus is inherently capable of being so used. It is well known in the art that a reactive coating gas can be used as a substitute for inert gas as the floating gas in a floating apparatus of the type disclosed by Hiura. See, for example, Aschner (6,005,226) at col. 3, lines 48-52. Therefore, Hiura's disclosed apparatus inherently includes all the apparatus structure necessary to be used according to the intended use recited in the preamble of claim 8.

Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Granneman in view of Hiura, Kisa and Foster. Granneman (abstract) teaches that a substrate can be coated by chemical vapor deposition (CVD) by supplying a coating precursor gas while the substrate is supported by flotation gas in a substrate flotation unit. It would have been obvious to provide the flotation pores of Granneman's wafer processing apparatus in the pore arrangement disclosed by Hiura and Kisa because Hiura and Kisa teach that such a pattern of holes can successfully be used to process a semiconductor wafer. Foster is cited for his teaching that it is desirable to rotate a wafer during CVD, and therefore one skilled in the art would have recognized that the floating wafer rotation means of Hiura and Kisa was useful and desirable in a floating wafer CVD apparatus such as that of Granneman.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Granneman in view of Hiura, Kisa and Foster, and in further view of Nishitani and White,

who teach the use of a gas distribution nozzle of a diameter equal to the diameter of a wafer to be coated in a CVD apparatus. It would have been obvious to use such a nozzle in the apparatus of Granneman because Nishitani and White teach that such a nozzle can successfully be used to supply coating gas to a wafer in a CVD apparatus.

Claims 7-9 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Aschner or Maruyama, who both disclose an apparatus for floating, rotating and CVD coating a wafer. The gas ejection pores of Aschner and Maruyama inherently perform the functions of both floating and rotating the wafer. Regarding the function of suppressing vibration, it is noted that vibration can inherently be suppressed by adjusting the rate of rotation, and therefore the gas ejection pores of Aschner and Maruyama are inherently capable of performing the function of suppressing vibration. It is noted also that claims 7-9 do not require the presence of centering pores.

Applicants have amended claim 1 to recite that "said plurality of auxiliary fine suppression pores being located radially further away from a center of the floating unit surface than said plurality of fine centering pores and said plurality of fine rotational pores". Upon further consideration, however, it can be seen that this further description of the claimed floating apparatus still reads on what is disclosed by Hiura. As noted in the discussion of Hiura in the above stated rejection, Hiura teaches that his "flotation" nozzles 5 can be angled toward the center of the wafer, and as such they perform the dual function of flotation and centering. As also noted in the above rejection based on Hiura, applicants' disclosed auxiliary fine suppression pores are functionally equivalent

to Hiura's positioning nozzles 4. Therefore, applicants' newly added limitation is met by Hiura, because Hiura's positioning pores 4 (which equate to applicants' auxiliary fine suppression pores) are radially further away from a center of his floating unit surface than his flotation nozzles 5 (which equate to applicants' centering pores when Hiura's flotation pores are angled to the center) and also radially further away than his rotation pores 6.

Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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